

Decision-driven scenarios for assessing four levels of uncertainty

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Senario planning would seem to be the perfect tool for managers making strategic decisions in today's highly uncertain, turbulent business environments. Yet according to a Bain & Company survey, a declining number of business executives use scenario planning tools[1]. Why have so many companies abandoned scenario planning at a time when one might expect it to be most useful?

In too many cases, scenarios have been designed to clarify longer-term visions, without regard for shorter-term decisions. As a result, middle and senior managers often find that time-consuming scenario planning efforts are distractions that provide little insight into the crucial strategic decisions at hand. Too often, scenario planners have "spent too much time going down paths that most of the organization didn't feel were the slightest bit relevant[2]".

These efforts likely failed because there was a fundamental mismatch between what the management team hoped to achieve and what the scenario planning process was designed to achieve. Managers wanted decision-driven scenarios, yet the process was designed to develop vision-driven scenarios.

Vision-driven scenarios help management teams think "outside the box" and question their assumptions about the future. They are used primarily to generate new strategic options, facilitate learning and dialogue throughout an organization, and develop a shared commitment to the need for change. Such scenarios, however, are not usually tied directly to any near-term strategic decisions.

Decision-driven scenarios, on the other hand, are used to inform a well-specified strategic choice – a choice where the "best" option is unclear due to uncertainty over

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the impact of that choice. For example, decision-driven scenarios have been used to help companies decide whether to launch new products given uncertain consumer demand, and whether to build new plants given uncertainty over the capacity-expansion plans of their competitors. In such cases, scenarios are used to evaluate explicit strategic options, determining their pay-offs across different scenarios and their overall risk-return profiles.

As Exhibit 1 summarizes, vision-driven and decision-driven scenario planning processes are designed to address very different company needs. If you pick the wrong process, you will undoubtedly be disappointed by the results of your scenario planning exercise. The first essential step in any successful scenario planning process, then, is to clarify the purpose of the process, including its expected end products. These expectations will define which of the two very distinct scenario-planning techniques you will want to consider[3].

Tailoring decision-driven scenarios to the four levels of uncertainty

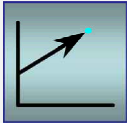
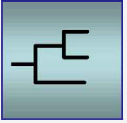


For those focused on near-term strategic decisions, there is no one-size-fits-all approach to developing effective decision-driven scenarios. Whether you should build such scenarios, and if so, how to build them depends on which one of the four levels of uncertainty that you face (Exhibits 2 and 3)[4].

Level 1: a clear enough future

Decision-makers face Level 1 uncertainty when the range of possible outcomes is narrow enough that this uncertainty does not matter for the decision at hand. This does not imply that the future is perfectly predictable, but rather that the future is predictable enough to identify a dominant strategy choice that is best across the range of potential outcomes. As you might guess, decision-makers in well-established markets that are not prone to external shocks or internal upheaval are the most likely to face Level 1 uncertainty.

Exhibit 1 Vision-driven vs. decision-driven scenarios		
	Vision-driven scenarios	Decision-driven scenarios
Nature of scenarios	<ul style="list-style-type: none">■ Emphasis on broad, macroeconomic and global drivers of change■ Longer term (5-10-20+ years)	<ul style="list-style-type: none">■ Focused on specific uncertainties that drive decision■ Generally shorter term (driven by time necessary to evaluate pay-off to decision)
Nature of process	<ul style="list-style-type: none">■ Emphasis on divergent thinking and broad perspectives■ Heavy reliance on outside experts, consultants and facilitators	<ul style="list-style-type: none">■ Data-driven and analytical when possible■ Heavy reliance on internal expertise and industry experts (unless major confidentiality concerns)
How scenarios are used	<ul style="list-style-type: none">■ Generate new strategic ideas■ Develop shared sense of possible futures and need for change■ Launch follow-on projects and analyses to further develop implications of the scenarios	<ul style="list-style-type: none">■ Test options for a specific decision against the range of potential outcomes and develop implications for which option to choose

Exhibit 2 The four levels of uncertainty

Level of uncertainty	Description	Example sources of uncertainty
	A clear enough future: can define point forecasts that are “close enough” for the decision at hand	<ul style="list-style-type: none"> ■ Returns on “common” investments in mature, stable markets ■ Customer and competitor reactions to strategies that reposition well-established brands
	Alternate futures: can define a limited set of possible future outcomes, one of which will occur	<ul style="list-style-type: none"> ■ Potential regulatory, legislative or judicial changes ■ Unpredictable competitor moves ■ All-or-nothing industry standards competition
	A range of futures: can define a range of possible future outcomes	<ul style="list-style-type: none"> ■ Demand for new products or services ■ New technology performance and adoption rates ■ Unstable macroeconomic conditions
	True ambiguity: cannot define even a range of possible future outcomes	<ul style="list-style-type: none"> ■ The outcomes of major technological, economic or social discontinuities ■ Market evolution in markets that are just beginning to form

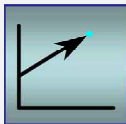
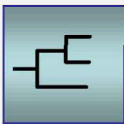
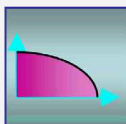

McDonald's, for example, generally faces Level 1 uncertainty when it makes its US restaurant location decisions. It can study potential customer demographics, traffic patterns, supply logistics, and the extent of competition in a given location and come up with a reasonably precise forecast of future restaurant earnings. And while such forecasts will be far from perfect, they will tend to be predictable enough to make a dominant yes-no decision on any potential US restaurant location. For example, McDonald's will not be able to predict a variable like traffic patterns with complete certainty, but it will be able to conclude – say with 95 percent confidence – that the traffic pattern either will or will not support a restaurant in any particular location.

Since uncertainty is so low, and dominant strategy choices can be identified, scenarios provide limited insight in Level 1 situations. In such cases, simple simulations and sensitivity analyses are preferred to more time- and expense-consuming scenario planning efforts.

McDonald's, for example, might vary its traffic pattern parameters within the range of possible outcomes to determine the impact of alternative assumptions on the expected earnings of a new franchise location. Such analyses would help quantify pay-off uncertainty (the ultimate pay-off to the decision is uncertain) even where there is no strategic uncertainty (the pay-off uncertainty is narrow enough that it does not matter for the decision at hand). Sensitivity analyses are easy to automate using standard spreadsheet programs and thus are almost costless to implement, yet

“ Organizations that face Level 2 uncertainty can define a mutually exclusive, collectively exhaustive set of possible outcomes. ”

Exhibit 3 A typology for decision-driven scenario planning

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Nature of scenarios	■ N/A	■ Mutually exclusive, collectively exhaustive (MECE) set of scenarios that describes each potential outcome	■ Representative set of 3-5 scenarios that largely covers the range of potential outcomes	■ Integrated sets of assumptions that one would have to believe about the future to support different proposed strategic options
Nature of process	■ Model the impact of uncertainty through sensitivity analysis, if at all	<ul style="list-style-type: none"> ■ Develop implications – financial and otherwise – of each outcome for the industry and company ■ Assign probabilities to each outcome, if possible ■ Describe the dynamic path to each outcome 	<ul style="list-style-type: none"> ■ Choose representative points along the continuum of possible outcomes ■ Develop implications financial and otherwise of these outcomes for the industry and company ■ Describe the dynamic path to each outcome 	<ul style="list-style-type: none"> ■ Work backwards from potential strategic options to scenarios that would support such options ■ Test for logic, likelihood and internal consistency through analogies and reference cases
How scenarios are used	■ N/A	<ul style="list-style-type: none"> ■ Assess the pay-offs to each strategic option in each scenario ■ Assess how each strategic option may influence the probability of each scenario ■ Combine these assessments with decision analysis techniques to choose the optimal strategic option 	<ul style="list-style-type: none"> ■ Assess the pay-offs to each strategic option in each scenario ■ Assess how each strategic option may influence the likelihood of different points along the continuum of outcomes ■ Combine these assessments with qualitative decision analysis logic to choose the desired strategic option 	<ul style="list-style-type: none"> ■ Test scenario assumptions through comparison with analogies, reference cases, and executive team experiences ■ Determine the set of assumptions (i.e. the scenario) that the management team is most comfortable supporting at this time

still provide useful information for financial planning purposes. Sensitivity analyses are a more cost-effective alternative to scenario planning techniques in such relatively predictable, Level 1 situations.

Level 2: alternate futures

Decision-makers face Level 2 uncertainty when they can define a limited set of possible future outcomes, one of which will occur, and when the best strategy to follow depends on which outcome ultimately occurs. For example, investors in the US stock market faced Level 2 uncertainty in trying to determine the identity of the next president of the USA throughout the fall of 2000. There was a well-defined set of possible outcomes, one of which would occur – the next president would be either George W. Bush or Al Gore. However, on election day, and even weeks later, no one could say for sure who had won. This uncertainty mattered to investors since the candidates proposed policies that might have divergent effects on the share prices of companies in certain industries. It was widely thought, for instance, that health insurance companies would benefit from a Bush victory.

Organizations that face Level 2 uncertainty can define a mutually exclusive, collectively exhaustive (MECE) set of possible outcomes. One, and only one, of these outcomes will actually occur. Potential regulatory, legislative, or judicial changes are often sources of Level 2 uncertainty. Will a proposed environmental legislation be passed? Will new regulations be imposed? Will the merger pass antitrust review or not? Similarly, unpredictable competitor moves and countermoves often create Level 2 uncertainty for business strategists. Will a competitor build a new plant? Enter a new market? The potential answers to all of these questions usually define a clear, MECE set of possibilities.

Scenario planning exercises under Level 2 uncertainty must define in great detail the MECE set of possible outcomes, and specify the implications each outcome has for the decision at hand. For example, what are the implications for the cost structure of a proposed new chemical plant if a pending environmental regulation is approved or if the regulation is rejected? What does this imply for the decision to build the new plant or not?

Scenario builders in this case should also attempt to determine the relative probabilities of these different outcomes, and to specify the dynamic path to each scenario. Will change come quickly, say, following a regulatory decision? Or will it be a gradual evolution, as in the establishment of a new technological standard? This is important information in Level 2 situations since it determines which market variables should be monitored most closely. As events unfold and the perceived probabilities of alternative scenarios change, it is likely that one's view of the "best" strategy will change. For example, as the chemical company receives more information on whether or not the environmental regulatory ruling is likely to favor new plant construction, it might choose to either accelerate, decelerate, or shut down its construction plans altogether.

Once scenarios and their probabilities (or at least a range of probabilities) have been defined, and strategies have been properly evaluated across each scenario, it is time to make decisions. By definition, in Level 2 situations you will not find a strategy that is dominant (has the highest pay-off) across all scenarios (dominant strategies are a feature of Level 1 situations, not Level 2). The strategist must choose between strategic options with different risk-return profiles across the different scenarios.

Decision analysis tools can be used to facilitate decision-making when there is no dominant strategy. Given your objectives – in particular, your willingness to accept risk – decision analysis techniques allow you to value strategic options that show different pay-off profiles across a set of scenarios. If you are risk neutral, for example, the strategy with the highest expected value across scenarios should be chosen. Risk-averse decision-makers, on the other hand, will prefer strategies with the most stable pay-offs, choosing to avoid strategies with high pay-off variances across the different scenarios.[5]

In any event, keep in mind that the probabilities of different scenarios can be highly dependent on a company's strategy choices. For example, if you face Level 2 uncertainty over whether or not a competitor will enter a new market, you must take into account the fact that the probability of either scenario may be influenced by your company's own decision to enter the market or not. Therefore, when evaluating the pay-off to different strategies across scenarios, you must focus on two questions:

1. What is the pay-off to this strategy in each scenario?
2. How does this strategy change the relative probabilities of each scenario?

Level 3: a range of futures

In some respects, Level 3 uncertainty is like Level 2 uncertainty: one can identify the range of possible future outcomes, but no obvious point forecast emerges. In both cases, this range is wide enough to matter for the decision at hand, but there is a very important difference: strategists facing Level 3 uncertainty can only bound the range of future outcomes – they cannot identify a limited MECE set of outcomes, one of which will occur. For example, they might be able to conclude that the five-year market penetration rate of a new consumer electronics product will fall somewhere between 5 percent and 40 percent, but they will not be able to conclude that the rate will be either 5 percent, 20 percent, 30 percent, or 40 percent. Any other rate between 5 percent and 40 percent is also a possibility in this case.

Customer demand for new products and services, and new technology performance and adoption rates, are both common sources of Level 3 uncertainty. Airbus, for example, faced Level 3 uncertainty when deciding whether or not to build its new A380 super-jumbo jet. Estimates of the size of the super-jumbo jet market ranged from 350 to 1,500 planes, and Airbus knew that it must sell approximately 500 planes to break even on the A380 investment.

Unstable macroeconomic conditions may also create Level 3 uncertainty for decision-makers. Macroeconomic instability in Argentina, for example, creates Level 3 uncertainty over the growth rate of demand for new telecommunication services there, a key variable for BellSouth to consider when making infrastructure investments in South America.

To illustrate the preferred decision-driven scenario approach in Level 3 situations, return to the A380 super-jumbo example. Market research indicates that the demand for super-jumbo jets will fall somewhere between 350 and 1,500 planes. Does this imply that one must develop different scenarios for every market size between 350 and 1,500 planes, determining the implications each would have for Airbus' product launch and promotion strategies? Or should one instead merely choose a limited set of plausible, representative outcomes between 350 and 1,500 planes to fully develop into scenarios? And if one chooses this route, how does one choose which outcomes to build scenarios around?

There are no simple answers to these questions, but there are a few general rules to follow. First, develop only a limited number of representative scenarios; the complexity of juggling more than four or five alternatives tends to hinder rather than facilitate sound decision-making. Second, avoid developing redundant scenarios that have no unique implications for strategic decision-making. Make sure each scenario offers a distinct picture of the future. Third, develop a set of scenarios that collectively accounts for at least the probable, if not possible, range of outcomes. Some companies prefer to develop "best" and "worst" case scenarios at the extreme ends of the spectrum of possible outcomes, while others develop "best" and "worst" case scenarios that span a tighter range of more probable outcomes. Either approach can work well so long as the "extreme" scenarios are not so extreme that they lose

“ Strategists facing Level 3 uncertainty can only bound the range of future outcomes. ”

credibility within the organization, and the “probable” scenarios are not so closely tied to the status quo that they provide a false sense of future stability and predictability.

As with Level 2 situations, once scenarios are defined, the next step is to identify potential dynamic paths to each outcome, and to evaluate each strategic option across each scenario. However, assigning probabilities to different scenarios does not make sense in Level 3 situations. When assigning probabilities you are implicitly assuming that you have identified a collectively exhaustive set of scenarios, one that includes all possible outcomes. But in Level 3 situations, in contrast to Level 2, your scenarios will only represent a subset of possible outcomes.

Since probabilities cannot be defined, it is impossible to calculate the expected value, standard deviation, and other key statistics that summarize the risk-return characteristics of a given strategic option. Nonetheless, the logic for evaluating strategic options is very similar in Level 2 and Level 3 situations. In either case, evaluating each option against each scenario allows managers to determine how robust different strategies are, and to assess the overall risk-return characteristics of these strategies. And in either case, companies can assess which scenarios become more and less likely based on their own strategy choices. The only difference is that in Level 3 situations, absent scenario probabilities, these evaluations cannot be reduced to the simple decision-making metrics such as expected values and other key statistics that are so useful to Level 2 decision makers. This implies that while the same, rigorous decision analysis logic applies to both Level 2 and Level 3 situations, qualitative “business judgment” factors will inevitably play a more prominent role under Level 3 uncertainty.

Level 4: true ambiguity

Future outcomes for Level 4 uncertainties are both unknown and unknowable. Analysis cannot even identify the range of possible future outcomes with certainty, or the most likely scenarios within that range.

Level 4 situations are rare, and they tend to degrade over time to lower levels of uncertainty. They are most likely to occur in markets during and immediately after major technological, economic or social discontinuities, as well as in markets that are just beginning to form. For example, a manager attempting to formulate United Airlines’ security strategy on 12 September 2001 faced Level 4 uncertainty. In the immediate aftermath of the horrific terrorist attacks that occurred on 11 September, even the most prescient security experts could not confidently bound the range of future terrorist activity.

Under conditions of Level 2 and 3 uncertainty, strategists analyze the situation to bound the range of possible future outcomes, and then develop scenarios that describe alternative outcomes within that range. Since this is impossible in Level 4 situations, the alternative is to work *backward* from potential strategic options to define “what you would have to believe” about a future scenario to support this option. For example, a manager was unable to bound the range of demand estimates for a new gene therapy, but he was able to “back out” what demand levels would be necessary to support the proposed research and development investment he was considering. Likewise, the United Airlines’ security manager could work backwards to identify which set of assumptions about future terrorist threats would make it worthwhile to arm pilots or train all flight attendants in the martial arts.

In Level 4 situations, a “scenario” is then an integrated set of assumptions about the future that supports a given strategic option. There is no analysis that you can do to determine conclusively whether any such scenario is likely or not; that is the definition

“Future outcomes for Level 4 uncertainties are both unknown – and unknowable.”

of Level 4 uncertainty. However, analogies and references cases can be useful in testing the logic, likelihood and internal consistency of Level 4 scenarios. If a proposed strategy requires faster consumer adoption rates than those observed for any analogous product launch, for example, it will probably make sense to reject this strategy in favor of another.

Given how different scenario planning exercises are in Level 4 situations, it should come as no surprise that the decision-making model is also unique. The decision analysis techniques favored in Level 2 and Level 3 situations are impossible to implement since the range of outcomes cannot be bounded. Instead, a qualitative, yet systematic checklist of key considerations should drive decision-making:

- (1) Which sets of integrated assumptions (i.e. scenarios) about the future seem credible given what can be learned from analogous situations and executive team experiences?
- (2) Of these credible scenarios, which support options that have the lowest downside risk? Highest upside reward? Which are most consistent with our organizational capabilities and long-term strategic goals?
- (3) Are there likely to be real first-mover advantages, or can commitments be staged over time? Which options allow for such staging, and which require upfront “big bets?”

In the end, strategic decision making under Level 4 uncertainty should involve “getting comfortable” with the logic, likelihood and internal consistency of the future scenario, or set of scenarios, that support your chosen strategy.

Getting the most out of scenario planning efforts

The typology summarized in Exhibits 1 and 3 can help you identify the scenario planning technique that is most appropriate given your company’s goals and the level of uncertainty that it faces. But identifying the right tool for the job does not necessarily guarantee success. Fortunately, three decades of business scenario planning applications have identified a number of best practices that help increase the

Exhibit 4 Keys to successful scenario planning regardless of which approach you take

- Ensuring top management sponsorship and involvement
- Collecting diverse inputs (internal and, when appropriate, external)
- Linking explicitly to strategic planning and capital allocation processes
- Crafting internally consistent scenarios, each supported by a dynamic story that makes sense
- Relying upon fact- and logic-based discussions and support analyses
- Avoiding the tendency to be overconfident in one’s ability to predict the future
- Focusing on both adapting to and shaping future scenarios
- Maintaining an ongoing process to monitor and update scenarios over time

probability of success regardless of which particular technique you choose to follow (see Exhibit 4)[6].

Armed with the right techniques and the right support practices, your scenario efforts are more likely to generate the valuable foresight that leads to clearer strategic visions and better strategic decisions.

Notes

1. Only 21.5 percent of North American executives in the Bain survey used scenario planning in 1999, a usage rate that was approximately 50 percent lower than the rate in 1994. For more Bain survey results, see Darrel Rigby (2001), "Management tools and techniques: a survey", *California Management Review*, Vol. 43 No. 2, Winter, pp. 139-59; Darrel K. Rigby (2001), "Putting tools to the test: senior executives rate 25 top management tools", *Strategy & Leadership*, Vol. 29 No. 3, pp. 4-12; and www.bain.com.
2. Darrel Rigby, Director, Bain & Company, as quoted in Bruce Melzer (2001), "The uncertainty principle", *CIO Insight*, Vol. 1 No. 2, 1 June.
3. Exhibit 1 also suggests that vision- and decision-driven scenario techniques are both essential components in any company's strategy toolkit. Companies should use concrete, decision-driven scenarios to make the right capital investment, marketing campaign and other strategic decisions when uncertainty implies that there is no "obvious" answer. At the same time, companies that sponsor vision-driven exercises every 1-3 years will be best positioned to recognize and capture the new opportunities and manage the risks inherent in today's rapidly changing business environments. These exercises help set valuable strategic and organizational priorities, and provide the necessary context for all decision-driven scenario efforts. Vision and decision-driven exercises are highly complementary, and the typology in Exhibit 1 tells you when – not if – to apply either one.
4. For more details on and examples of the four levels of uncertainty, see Hugh Courtney (2001), *20/20 Foresight: Crafting Strategy in an Uncertain World* (Harvard Business School Press); and Hugh Courtney *et al.* (1997), "Strategy under uncertainty", *Harvard Business Review*, November-December, pp. 66-79.
5. For more information on decision analysis, consult one of the many practitioner-oriented textbooks such as Robert T. Clemen (1996), *Making Hard Decisions: An Introduction to Decision Analysis* (Duxbury Press), or David C. Skinner (1999), *Introduction to Decision Analysis: A Practitioner's Guide to Improving Decision Quality* (Probabilistic Publishing).
6. For more on scenario planning best practices and pitfalls, see Paul J.H. Schoemaker (1998), "Twenty common pitfalls in scenario planning", in Liam Fahey and Robert M. Randall (Eds), *Learning from the Future: Competitive Foresight Scenarios* (John Wiley & Sons). The Fahey and Randall compilation is a fine general resource for scenario planning techniques and best practices.